ANNUAL REPORT 1964

UNION

water system

DIVISION OF PLANT OPERATIONS

Ontario Water Resources Commission

ONTARIO WATER RESOURCES COMMISSION

OFFICE OF THE GENERAL MANAGER

Members of the Union Local Advisory Committee.

Gentlemen:

We are pleased to provide you with the 1964 Operating Report for the Union Water Treatment Plant, OWRC Project No. 57-W-12.

By continuing the mutual cooperation which has existed in the past, we can look forward to greater progress in the field of water supply.

Yours very truly,

D. S. Caverly, P. Eng.,
General Manager

General Manager,
Ontario Water Resources Commission.

Dear Sir:

It is with pleasure that I present to you the Annual Report of the operation of the Union Water Treatment Plant, OWRC Project No. 57-W-12 for 1964.

This report presents design data, outlines operating problems encountered and summarizes in tables, charts and graphs all significant flow and cost data.

Yours very truly,

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

FOREWORD

This report describes the operation of this project for the year 1964. It includes a detailed description of the project, summary of operation, graphs and charts showing quality and quantity information, and project cost data.

This information will be of value to the municipality in assessing the adequacy of the works in meeting existing requirements and in projecting its capability to meet future expected demands. The cost information will be of particular interest to those concerned with developing and maintaining revenue structures.

The preparation of this report has been a cooperative effort of several groups within the Division of Plant Operations. These include the Statistical Section, Brochures Officer and the Regional Supervisor. However, the primary responsibility for the content has been with the Regional Operations Engineer. He will be pleased to discuss all aspects of this report with the municipality.

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

CONTENTS

UNION

water treatment plant

operated for the

TOWN OF LEAMINGTON
TOWN OF ESSEX
TOWNSHIP OF GOSFIELD NORTH
TOWNSHIP OF GOSFIELD SOUTH
TOWNSHIP OF MAIDSTONE
TOWNSHIP OF MERSEA
H. J. HEINZ COMPANY OF CANADA LIMITED

by the

ONTARIO WATER RESOURCES COMMISSION

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COMMISSION SECRETARY

W. S. MacDonnell

DIVISION OF PLANT OPERATIONS

DIRECTOR: B. C. Palmer

Assistant Director: C. W. Perry
Regional Supervisor: A. Beattie
Operations Engineer: P. J. Osmond

801 Bay Street **Toronto 5**

'64 REVIEW

This report presents in significant detail the 1964 operating data for the Union Water System. Also included are sections on project formation, process description, design data, personnel and costs.

The total plant output in 1964 was down 3% from the 1963 production. Significant changes in consumption occurred in Gosfield North, Maidstone, Leamington and H. J. Heinz Company. The data shows that the Townships of Mersea and Gosfield South are the only participants using more than their guaranteed minimums. Flow patterns from the plant changed very little in 1964 as compared to 1963.

Raw water turbidities trended upwards in 1964, however, very satisfactory removal was maintained. Similarly chlorine demands were up slightly.

The complete operating costs for the Union Water System for 1964 were $126,041.07 an increase of $13,408.35 or 11.9% over 1963. The production cost of water over the past four years has been 7.3, 7.7, 8.2 and 9.2 cents per thousand gallons. The increased cost in 1964 is almost entirely due to increased taxation.

OWRC head office technicians spent 42 manhours inspecting and reporting on the routine mechanical and electrical maintenance carried out by the plant staff. The reports indicate a high degree of competence on the part of the plant staff.

The policy of alternating irrigation did not get a fair trial during the year due to the wet season, however, it is expected this policy will show its usefulness in 1965.

A planning report on the future expansion of the Union Water System was initiated during the year by the consulting firm of Gore and Storrie Limited, and is to be finalized in 1965. It is hoped that this report will indicate the means by which the system can expand in an orderly and equitable manner.

GLOSSARY

BTU	British Thermal Unit
flocculation	bringing very small particles together to form a larger mass (the floc) before settling
fps	feet per second
gpm	gallons per minute
lin. ft.	linear feet
mgd	million gallons per day
pH	a symbol for hydrogen-ion concentration; a pH test determines the intensity of the acidity or alkalinity of a water
ppm	parts per million
ss	suspended solids
SWD	side wall depth
TDH	total dynamic head (usually refers to pressure on a pump when it is in operation)
turbidity	a measurement of the amount of visible material in suspension in water

HISTORY
1956 – 1964

INCEPTION

In 1956, the Towns of Leamington and Essex and the Townships of Gosfield North, Gosfield South, Mersea and Maidstone together with the H. J. Heinz Company of Canada Ltd. and the Ontario Water Resources Commission initiated plans for a modern water treatment plant.

The firm of C. G. Russell Armstrong, Consulting Engineers, Windsor, Ontario was retained to formulate plans for the project.

APPROVAL

The above participants signed an agreement with the Ontario Water Resources Commission in 1957 to finance, construct, maintain and operate the plant.

CONSTRUCTION

Construction commenced in 1958 –

Canadian Dredge and Dock – Toronto, Ontario – constructed a water intake and the low lift pumping station.

Schwenger Construction Ltd. – Hamilton, Ontario – constructed the water treatment plant. In November 1960, the Division of Plant Operations undertook the operation of the plant.

TOTAL COST

$ 3,860,000.00.

Project Staff

Mr. Harold Sanger,
Superintendent

Mr. William Allsop	Assistant Superintendent and Plant Electrician
Mr. Gordon Campbell	Plant Mechanic
Mr. Scott Baltzer	Plant Operator
Mr. Glen Pinch	Plant Operator
Mr. David Standen	Plant Operator
Mr. Golden Stockwell	Plant Operator
Mr. Robert Takaki	Plant Operator
Mr. Walter Pope	Grounds Maintenance

COMMENTS

During the year, the total staff at the plant decreased by one to a total of nine with the resignation of Mr. Schaafsma on September 21, 1964. A replacement will be hired in 1965 to bring the staff to its rated complement of ten.

Two operators Mr. Standen and Mr. Stockwell attended the basic and intermediate sessions of the OWRC course of instruction for Water Works operators and will complete the course in 1965.

Mr. Takaki attended a course in Toronto sponsored by the OWRC, during the year, in algae identification and enumeration.

The plant staff, as a whole, were presented with a Safety Award from the A. W. W. A.

Description of Project

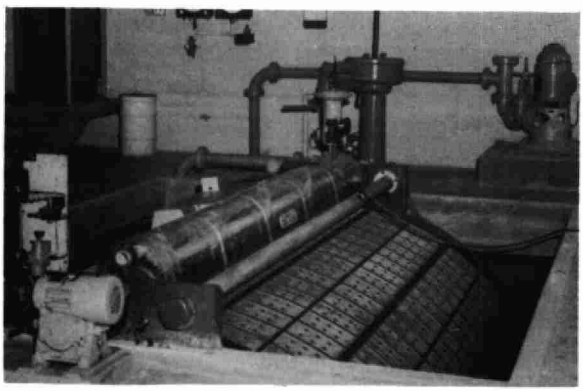
INTAKE

Water is drawn through the intake pipe to the low lift pumping station situated on the shore of Lake Erie. Solid material is excluded by a bar screen and an automatic travelling mesh screen.

LOW LIFT PUMPING STATION

At the low lift station, the screened lake water is pumped up to the treatment plant by four vertical turbine pumps. One of the pumps is provided with a standby diesel engine in case of power failure. All pumps including the diesel are automatically controlled.

Water from the low lift station is pumped up a height of 75 feet to the treatment plant between Union and Ruthven through 2,000 feet of 24 inch reinforced concrete pressure pipe.



MICROSTRAINER

MICROSTRAINER

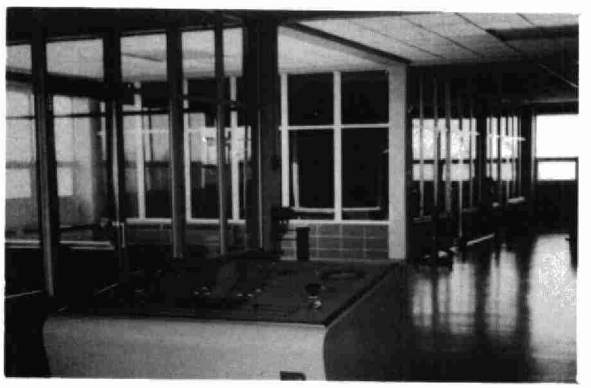
Upon reaching the treatment plant, the raw water passes through a microstrainer which is a revolving drum equipped with extremely fine woven stainless steel cloth. The microstrainer removes most of the algae and other foreign material from the raw water as it passes from the inside of the drum to the outside. The speed of the drum and the backwash water pressure are automa-

tically controlled by the water level differential across the fabric. All solids are flushed down a sewer to the lake.

CLARIFIER

After passing through the microstrainer, the finely screened water passes through a solids contact clarifier which removes most of the suspended solids and turbidity down to about three parts per million. Chemicals such as liquid alum and chlorine are added to the clarifier to coagulate the solids and improve settling. The solids settle to the bottom as a sludge and are withdrawn automatically by time clock control.

Activated carbon is sometimes added to the clarifier for taste and odour control.



FILTER CONSOLE

FILTRATION

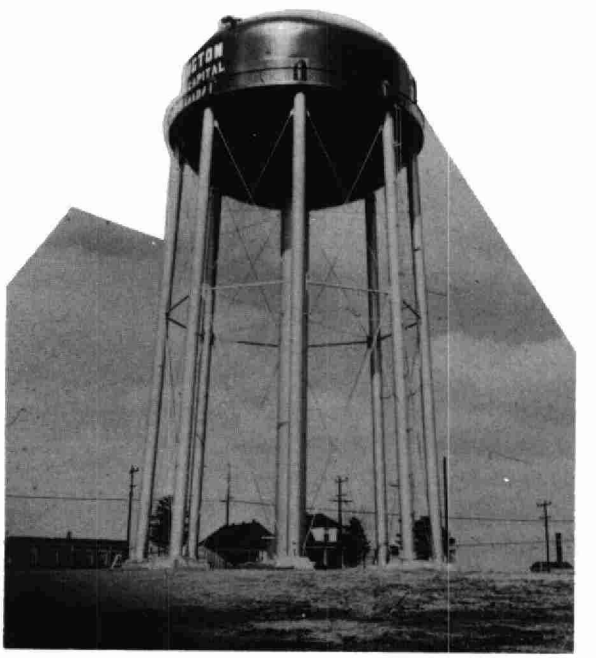
Clarified water receives its final filtering and polishing by passing through four double type rapid sand filters which operate automatically on demand. The rapid sand filters are constructed of layers of sand and gravel which remove most of the remaining turbidity in the water as it flows down through the filter . Material trapped in the sand and gravel is backwashed out by reversing the flow of water in the filter.

DISTRIBUTION

After passing through the filters, the clear water is stored in a large underground reservoir at the plant. As water is demanded from the system, it flows from the reservoir to the high lift clear well where it receives its final chlorination before being pumped into the system by five high lift pumps. One of the pumps is provided with a standby diesel engine in case of power failure.

Treated water is pumped to Essex through a trunk main following Highway #3. A booster pumping station is located at Cottam. Ground level storage and elevated storage is provided at Essex.

Treated water is pumped to Leamington and the H. J. Heinz Company through trunk mains along Highways #3 and #18 with elevated storage being provided on Highway #3 between the plant and the Town of Leamington.



ELEVATED TANK

PROJECT COSTS

The total cost to the municipality during 1964 was as follows:

NET OPERATING

Essex	$17,424.61	
Leamington	38,539.66	
H. J. Heinz	51,129.33	
Gosfield North	2,314.78	
Gosfield South	7,051.34	
Mersea	12,075.68	
Maidstone	1,083.16	
		$129,618.56

DEBT RETIREMENT

Essex	$13,360.47	
Leamington	21,260.99	
H. J. Heinz	28,207.62	
Gosfield North	1,772.17	
Gosfield South	3,874.01	
Mersea	7,255.56	
Maidstone	1,796.08	
		$ 77,527.00

RESERVE

Essex	$ 4,317.05	
Leamington	7,428.01	
H. J. Heinz	9,854.80	
Gosfield North	570.28	
Gosfield South	1,357.30	
Mersea	2,458.98	
Maidstone	481.58	
		$ 26,468.00

INTEREST CHARGED

Essex	$37,235.24	
Leamington	59,277.16	
H. J. Heinz	78,644.84	
Gosfield North	4,937.39	
Gosfield South	10,804.37	
Mersea	20,229.32	
Maidstone	5,012.39	
		$ 5,012.39
TOTAL COST		$449,754.27

Summary of Participants' Share
in 1964 Charges

Essex	$ 72,337.37
Leamington	126,505.82
H. J. Heinz	167,836.59
Gosfield North	9,594.62
Gosfield South	23,087.02
Mersea	42,019.64
Maidstone	8,373.21
	$449,754.27

LONG TERM DEBT: The municipality's long term debt to the OWRC, revised December 31, 1964, was $3,841,802.00

OPERATING COSTS

Total Operating Cost		$123,993.16
Essex East		734,66
Essex West		1,304.25
Total System Cost		$126,041.07
Deduct penalties for late payment:		
H. J. Heinz	$14.46	
Gosfield N.	8.05	
		22.51
		$126,018.56
Add containers		3,600.00
Total Net Operating		$129,618.56

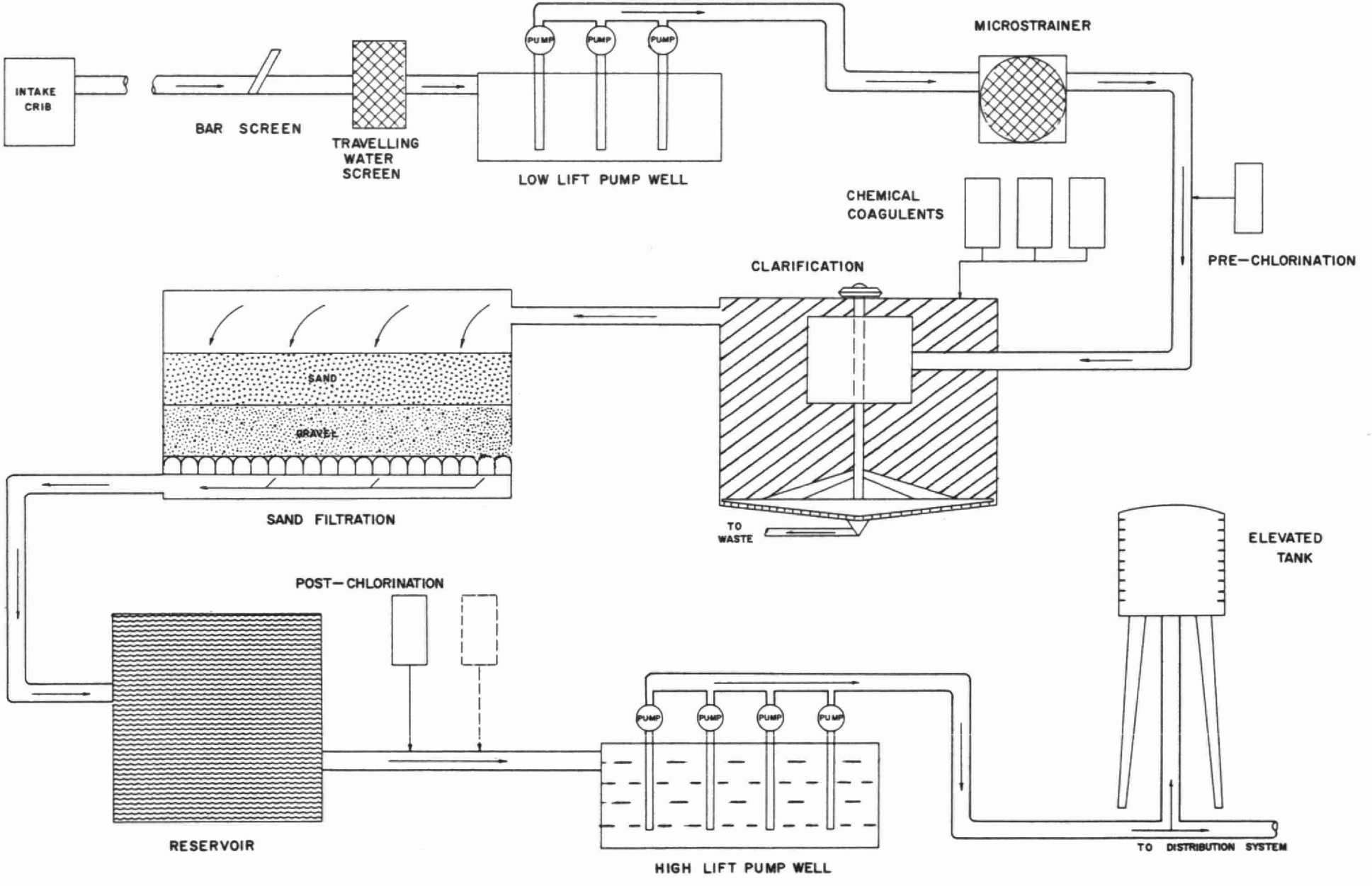
MONTHLY COSTS

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	SUNDRY
JAN	$6299.61	$3570.22			$2064.35		$ 292.52		$ 110.00	$262.52
FEB	7344.72	3570.22		$ 552.72	2109.36		91.80	$ 15.39	742.25	262.98
MARCH	8064.73	3929.02		553.69	1978.95	$ 587.05	193.17		92.47	730.38
APRIL	9710.23	3590.83		528.69	2015.74	612.48	488.77	2260.31		213.41
MAY	9225.61	5392.65		459.69	2048.73	585.00	153.34	40.38	458.05	387.77
JUNE	10384.70	4039.65		218.30	2113.16	3150.76	116.53	113.04	315.85	317.41
JULY	7781.83	3595.10		37.70	2577.69	585.12	207.81	16.69	178.69	582.95
AUG	6095.38	3595.10		14.24	2735.41	(1216.31)	274.10		464.83	228.01
SEPT	12393.17	3595.10		14.63	2418.88	3191.39	144.81		95.75	2932.61
OCT	9383.51	3336.18		65.97	2619.15	2493.26	285.58	88.72	129.09	365.56
NOV	6379.27	3301.58		109.52	2184.52	73.00	150.04	151.66	336.67	72.28
DEC	30630.40	5419.46		635.32	3944.65	(492.20)	573.51	80.27	666.91	19802.48
TOTAL	123993.16	46935.11		3190.55	28810.59	9569.55	2971.98	2766.46	3590.56	26158.36
ESSEX EAST	743.66									743.66
ESSEX WEST	1304.25				712.37					591.88

BRACKETS INDICATE CREDIT

TOTAL SYSTEM COST: $126,041.07

PLANT FLOW CHART



Design–Data

Units

All capacities listed in Imperial gallons.

Intake

Fourteen hundred feet of 54 inch asbestos coated corrugated steel pipe.

Minimum depth of water above intake crib 15 feet.

Design capacity 32 MGD.

Maximum velocity at 32 MGD – 3.5 f.p.s.

Ten foot diameter steel bellmouth intake inside an 18 foot square timber crib.

Low Lift Pumping Station

One and one half x 3/8 inch coarse bar screen at 3 inch centers.

Travelling mesh screen with 1/4 inch openings having a flow through velocity of 1.8 feet per second.

Pump well 47' x 19' x 15' deep – Volume 83,500 gallons.

Pumps – Vertical Turbine

No. 1 – 1500 GPM @ 100' head – 60 HP (2 MGD approx.)

No. 2 – 3000 GPM @ 100' head – 125 HP (4 MGD approx.)

Equipped with 110 B.H.P. 6 cylinder diesel standby.

No. 3 – 3000 GPM @ 100' head – 125 HP (4 MGD approx.)

No. 4 – 1500 GPM @ 100' head – 60 HP (2 MGD approx.)

No. 5 – Provision for extra low lift pump.

Total low lift pumping capacity – 12 MGD.

Pumps operate in four steps on a two week equalizing cycle.

Treatment Plant

Microstrainer

Ten ft. long x 10 ft. diameter.

Equipped with Mark-1 fabric having maximum openings of 1/7000 inch. (35 microns).

Design capacity 7.6 MGD.

Clarifier

Ninety-four ft. diameter x 19 ft. SWD Graver Reactivator.

Design capacity 8 MGD maximum at turbidity of 600 ppm.

Volume – 823,000 gallons.

Detention time at 8 MGD – 2.5 hours.

Chemical Feeders

Two proportioning pumps each with 30 gallon per hour capacity for feeding liquid alum.

Two positive displacement volumetric dry chemical feeders for activated carbon, coagulant aids, etc.

Capacity of each 40 pounds of chemicals per hour.

pH Indicator – records pH of water between pH limits of 5.5 and 10.5.

Chlorination

Three Wallace & Tiernan V-notch chlorinators each with a capacity of 2000 lbs. per 24 hours.

Chlorination - Continued

Pre-chlorinator, post-chlorinator and standby chlorinator.

A double indication chlorine residual recorder records chlorine residual in water as it leaves the filters in the case of pre-chlorination and as it enters the distribution system in the case of post-chlorination.

Chlorine storage for six one-ton cylinders.

Weigh scale graduated to 5000 pounds.

Sand Filters

Four 18' x 36' double type filters.

Design capacity of each 2 MGD.

Design filtering rate 2.15 gallons per sq. ft. per minute.

Filters constructed of pre-cast bottom, five layers of gravel each 3 inches deep, and 27 inches of sand.

Backwash pump 4200 GPM @ 35' head - 75 HP.

Backwash rate 13 gallons per sq. ft. per minute.

Rise rate 21" per minute.

Equipped with Palmer surface jet wash facilities.

Storage Reservoir

182.5' x 122.5' x 14.8' deep. Volume 2,000,000 gallons.

Usable Volume - 1,730,000 gallons.

High Lift Pumps -Horizontal Centrifugal

No. 6 - 1800 GPM @ 200' head - 200 HP (2.6 MGD).

No. 7 - 2600 GPM @ 200' head - 200 HP (3.7 MGD).

No. 8 - 3600 GPM @ 200' head - 300 HP (5.2 MGD).

Equipped with diesel standby.

No. 9 - 7200 GPM @ 200' head - 500 HP (10.3 MGD).

No. 10 - 800 GPM @ 200' head - 60 HP (1.1 MGD).

Total high lift pumping capacity 23 MGD

Pumps are operated on a five step pressure control system.

Distribution System

Thirty inch diameter reinforced concrete pressure pipe on Hwy. No. 3 east.

Twelve inch diameter cement lined cast iron pipe on Hwy. No. 18 east.

Capacity approximately 16 MGD.

Twelve inch diameter cement lined cast iron pipe on Hwy. 3 to Cottam.

Capacity approximately 3 MGD.

Twelve inch diameter asbestos cement pipe from Cottam to Essex.

Main delivers water to 2 MGD ground storage reservoir owned by Essex P.U.C. and is pumped to a 250,000 gallon tower.

Elevated Storage

330,000 gallon 100 ft. high on Hwy. 3.

Cottam Booster Station

1,000 GPM horizontal centrifugal pump at 100' head (1.3 MGD).

Pump cuts in automatically at 40 psi and out at 50 psi.

Technical Section

TOTAL AREA FLOW

Month	Total Flow MGD	Avg. Max. MGD	Avg. Min. MGD	Avg. Daily MGD	Cumulative Total
January	85.597	3.369	1.884	2.76	85.597
February	68.721	2.607	1.774	2.37	154.318
March	76.597	3.015	1.739	2.47	230.915
April	82.030	3.197	1.975	2.73	312.945
May	121.480	5.540	3.395	3.92	434.425
June	148.071	6.410	3.565	4.94	582.496
July	193.812	7.397	4.780	6.25	776.308
August	139.687	6.984	3.248	4.51	915.995
September	158.529	6.433	3.220	5.34	1074.524
October	110.076	4.397	2.560	3.73	1184.600
November	89.431	3.561	1.706	3.12	1274.031
December	93.624	3.779	1.714	2.88	1367.655
Total	1367.655				
Average	113.971	4.724	2.630	3.71	

COMMENTS

During 1964, a total of 1367.655 million gallons of water were treated at, and pumped from, the plant. This is as per the reading of meter No. 1. It should be noted that this reading is slightly greater than the cumulative readings of the area meters. The difference is 0.61% and is attributable mainly to meter discrepancies and line losses.

The total plant output for 1964 is down approximately 3.0% from 1963. The average daily flow of 3.71 million gallons represents 48.9% of plant design capacity, i.e. 7.6 MGD. The average maximum daily flow of 4.72 million gallons represents 63% of plant design capacity.

CONSUMPTION OF PARTICIPANTS

Participant	CONSUMPTION (MG)					% OF TOTAL				
	1960	1961	1962	1963	1964	1960	1961	1962	1963	1964
Gosfield S	16.34	37.29	51.74	74.96	75.01	1.6	2.0	3.9	5.4	5.5
Gosfield N	9.95	13.13	21.60	29.53	23.35	0.9	1.1	1.6	2.1	1.7
Mersea	55.70	79.85	99.51	137.71	127.96	5.3	6.5	7.4	9.8	9.4
Leamington	335.00	399.91	404.04	455.70	407.97	31.8	32.5	30.4	32.5	30.0
Heinz	500.00	534.50	557.04	520.40	541.00	47.5	43.5	41.8	37.1	39.8
Essex	130.00	158.58	190.04	177.07	174.46	12.4	12.9	14.3	12.6	12.8
Maidstone	5.41	6.37	8.45	7.46	9.62	0.5	0.5	0.6	0.5	0.8
TOTAL	1052.40	1229.63	1332.42	1402.83	1359.37	100.0	100.0	100.0	100.0	100.0

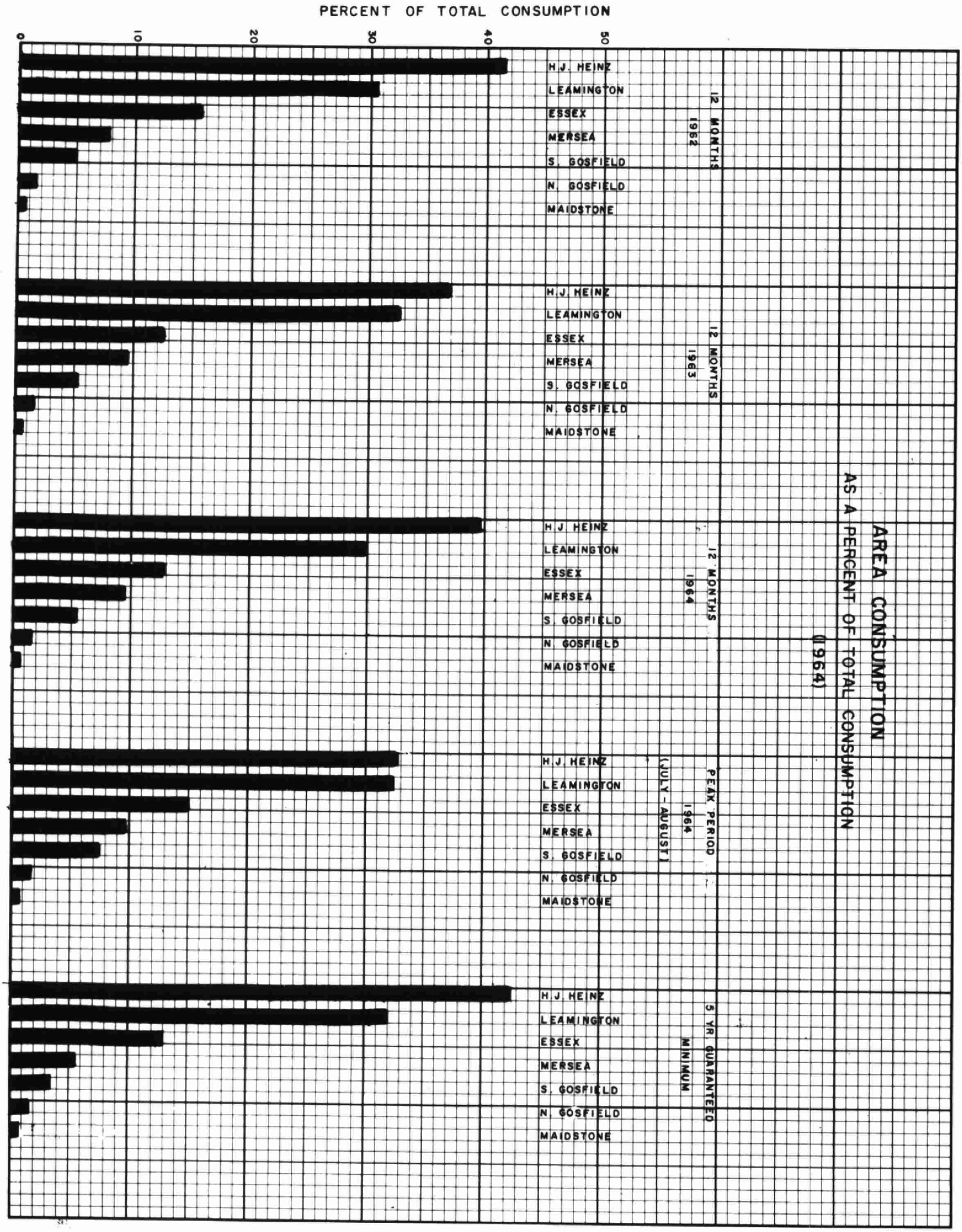
COMMENTS

The most significant data evident in the above chart is as follows:

1. Gosfield N. consumption is down 21% from 1963.
2. Leamington consumption is down 50 MG from 1963.
3. Heinz consumption is up 21 MG from 1963.
4. Maidstone consumption is up 20% from 1963.

It is also evident that over the last two to three years a trend towards stability of annual consumption is becoming apparent in the case of each participant.

The accompanying graph of each participant's consumption as a percent of total consumption shows that during the peak months of July and August, the consumption of Heinz decreased while the percent consumption of most of the other participants increased slightly. The graph also shows that the Townships of Mersea and Gosfield S. are the only participants using well over their guaranteed minimums.


AREA CONSUMPTION
AS A PERCENT OF TOTAL CONSUMPTION
(1964)
PERCENT OF TOTAL CONSUMPTION
0
10
20
30
40
50
12 MONTHS 1962
H.J. HEINZ
LEAMINGTON
ESSEX
MERSEA
S. GOSFIELD
N. GOSFIELD
MAIDSTONE
12 MONTHS 1963
H.J. HEINZ
LEAMINGTON
ESSEX
MERSEA
S. GOSFIELD
N. GOSFIELD
MAIDSTONE
12 MONTHS 1964
H.J. HEINZ
LEAMINGTON
ESSEX
MERSEA
S. GOSFIELD
N. GOSFIELD
MAIDSTONE
PEAK PERIOD 1964 (JULY - AUGUST)
H.J. HEINZ
LEAMINGTON
ESSEX
MERSEA
S. GOSFIELD
N. GOSFIELD
MAIDSTONE
5 YR. GUARANTEED MINIMUM
H.J. HEINZ
LEAMINGTON
ESSEX
MERSEA
S. GOSFIELD
N. GOSFIELD
MAIDSTONE

Flow Data

PLANT FLOW

Graph No. 1 shows that total annual flow and peak monthly flow have held fairly steady over the last two years. The 1964 peak month was July when 194 MG of water were pumped. This represents an average daily flow of 6.26 MG which is 82.4% of the plant design capacity.

H. J. HEINZ

Graph No. 2 shows that annual consumption rose slightly in 1964 and that the peak monthly consumption occurred in September. It should be noted that the Heinz peak does not coincide with the plant peak.

LEAMINGTON

Graph No. 3 shows a decrease during 1964 in both total annual consumption and the peak monthly flow. It is interesting to note that in the peak month of July, the Town of Leamington consumed approximately 15% more water than the H. J. Heinz Company.

ESSEX

Graph No. 4 shows that total annual consumption and peak monthly flow are holding relatively steady. The peak of 26.5 MG occurred in July.

MERSEA

Graph No. 5 shows decreases in both total annual flow and peak monthly flow. The peak of 21 MG occurred in May and was off plant peak.

GOSFIELD SOUTH

Graph No. 6 shows no change in total annual consumption from the previous year, however, it does show a decreased peak monthly flow. The peak of 13 MG occurred in July and a strong secondary peak of approximately 12 MG occurred in May.

GOSFIELD NORTH

Graph No. 7 shows a marked decrease in both total annual flow and peak monthly flow. The peak of 2.6 MG occurred in July.

MAIDSTONE

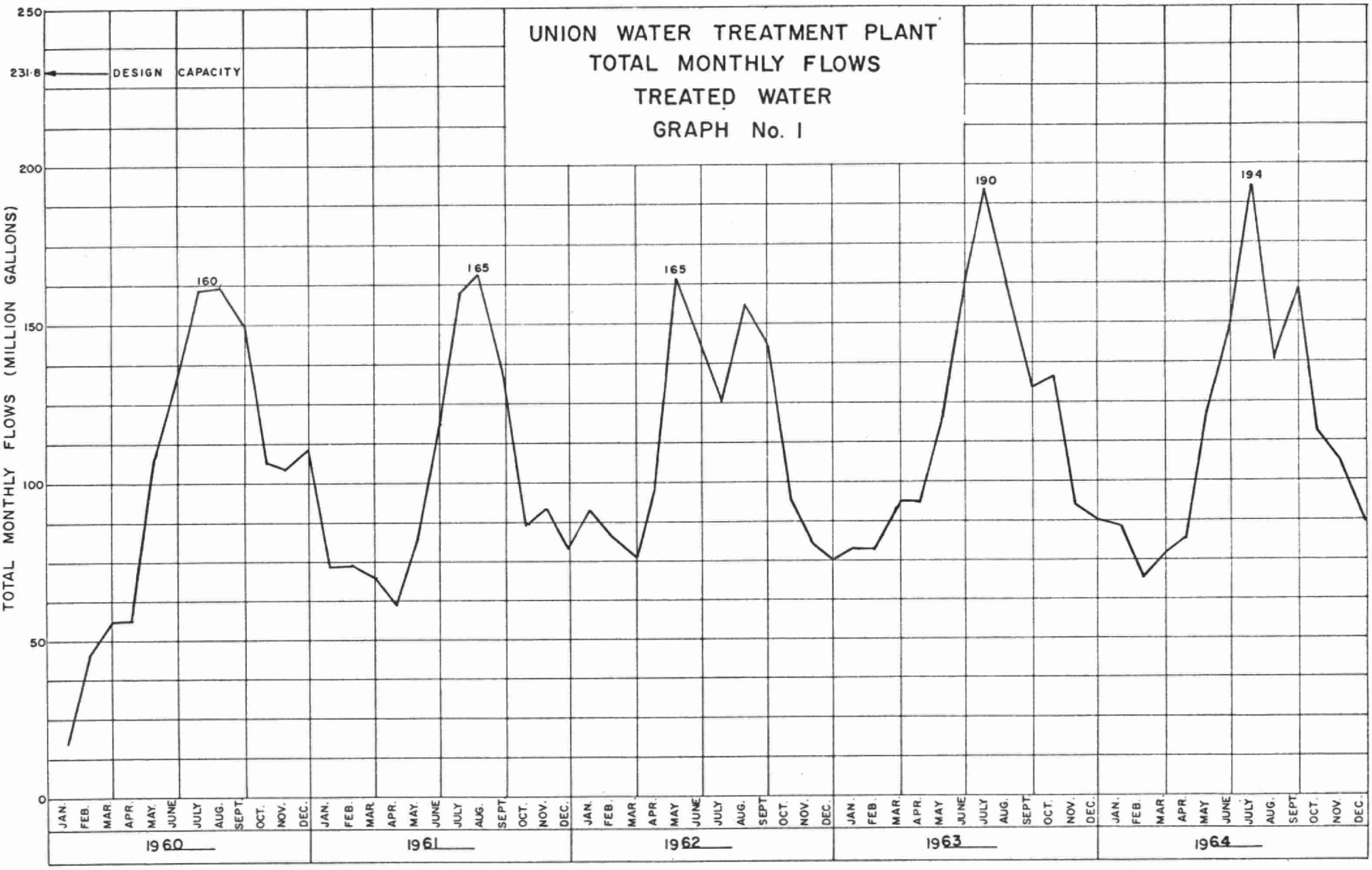
Graph No. 8 shows a marked increase in total annual consumption with steadying peak monthly flows. The peak of 1.48 MG occurred in July and a strong secondary peak of 1.36 occurred in October.

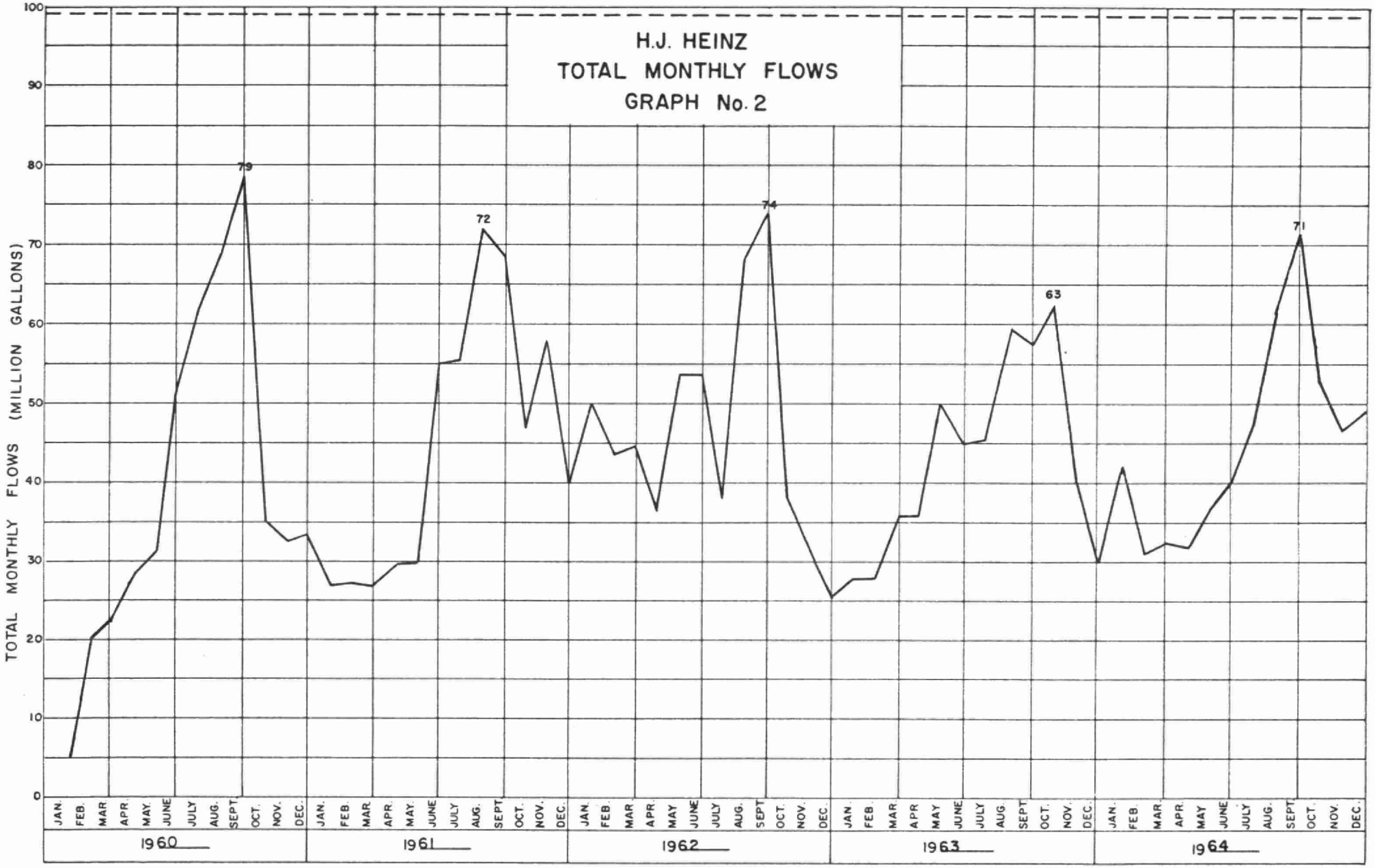
FLOW PROBABILITY

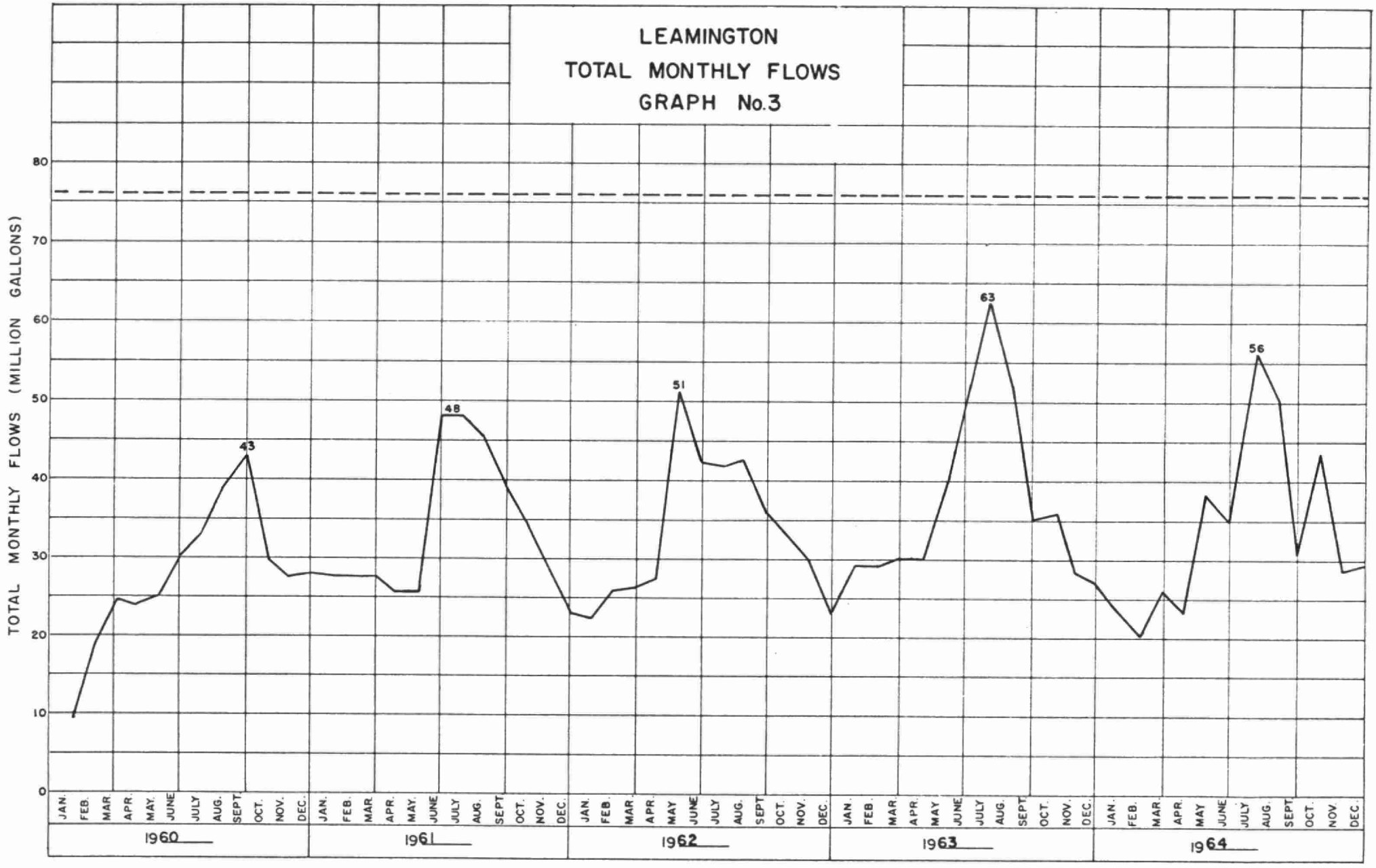
Graph No. 9 indicates the percent of time that the daily flow equals or is greater than a certain value. For instance, 50% of the time the daily flow from the plant is equal to or greater than 3.5 MG. Similarly 10% of the time flow exceeded 6.3 MG and 90% of the time flow exceeded 2.2 MG.

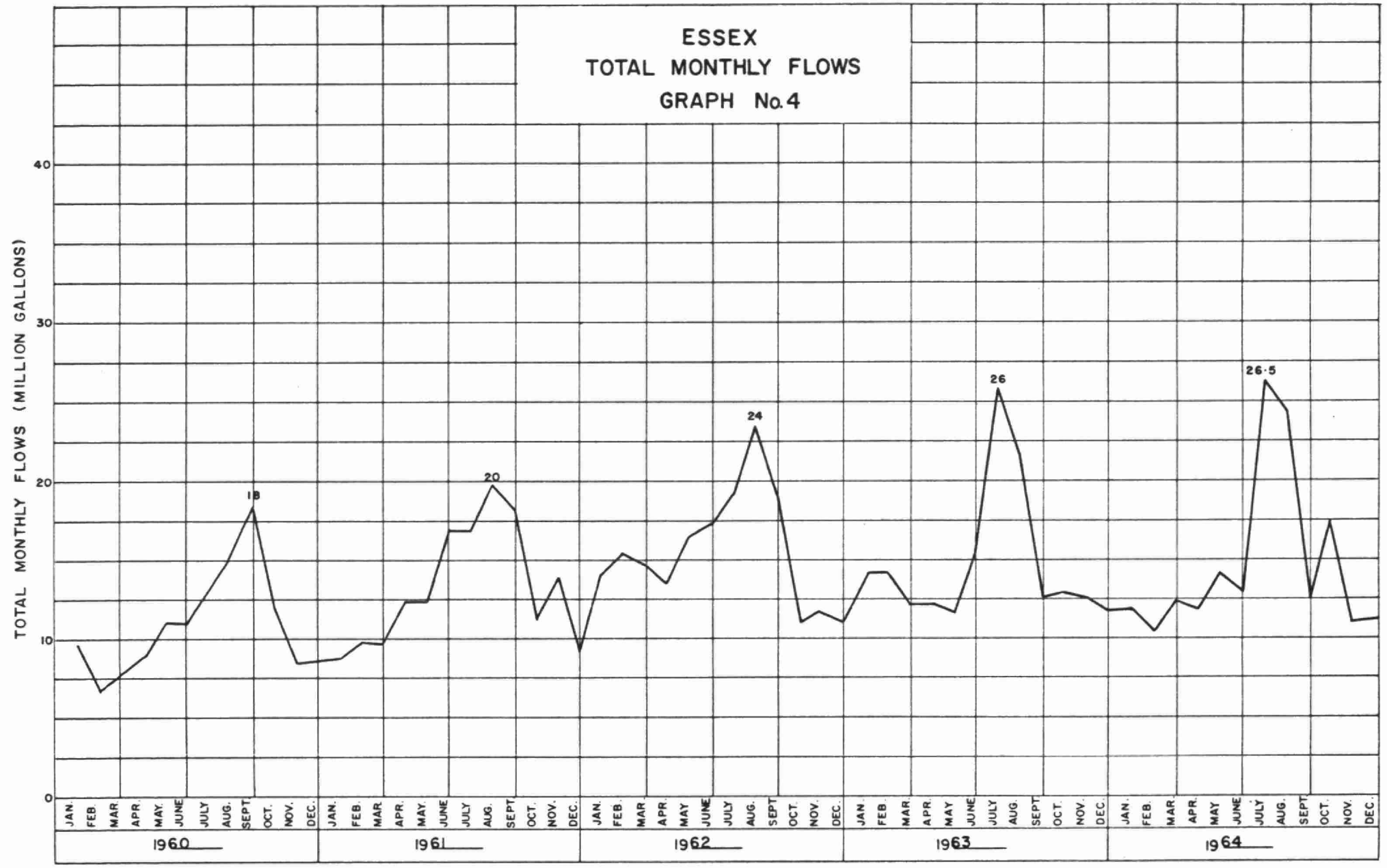
PEAK DEMAND

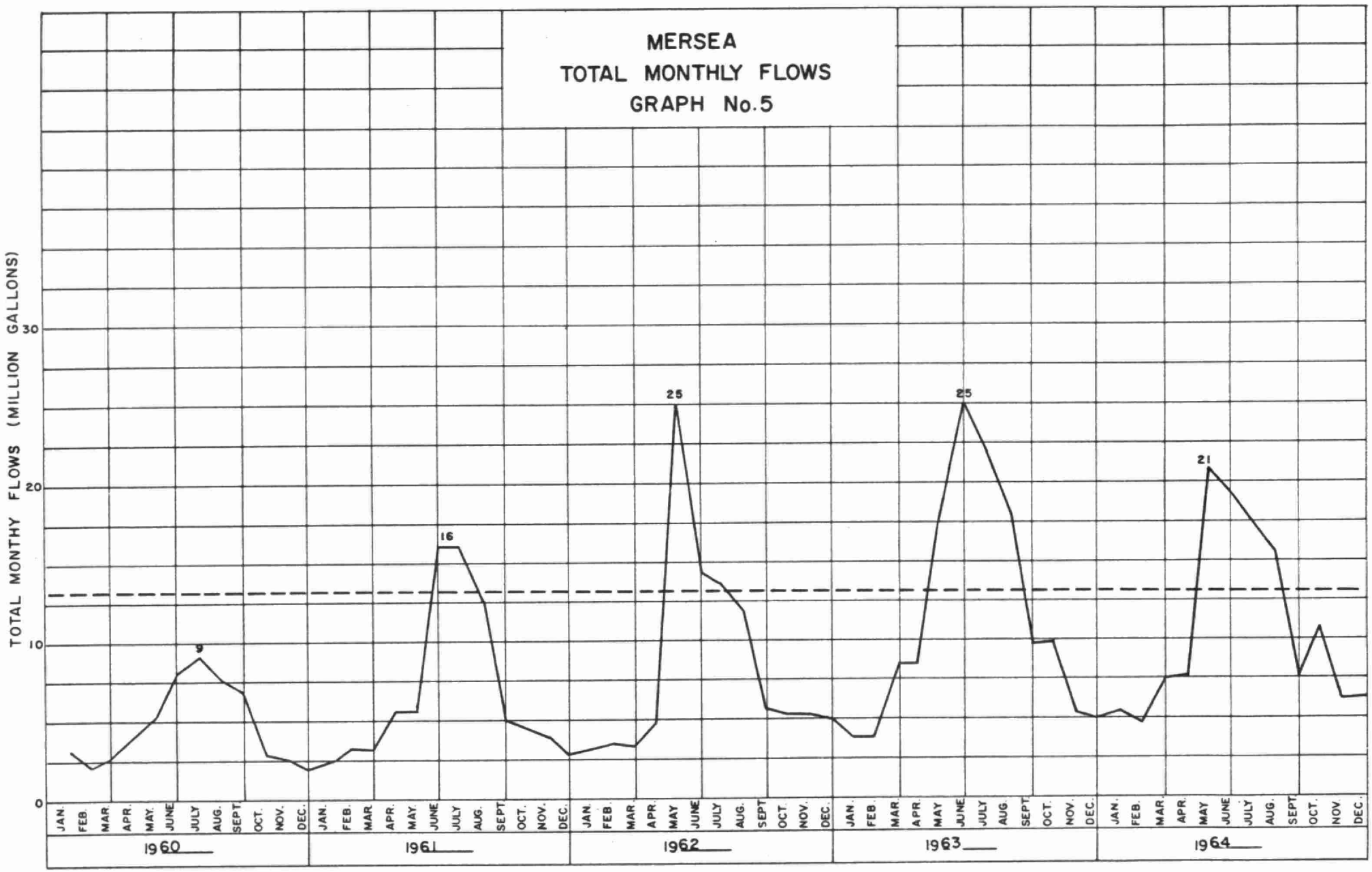
Graph No. 10 indicates that the long term demands on the plant decreased slightly in the range from three days to one month inclusive. The short term demands from six hours to two days increased marginally. The bulk of the 1964 peak demands occurred in the later part of June and early in July. It is probable that the abnormally wet weather experienced in 1964 was responsible for the decrease in long term demands. It is expected that the peak demands will increase markedly in 1965 provided that normal weather conditions prevail.

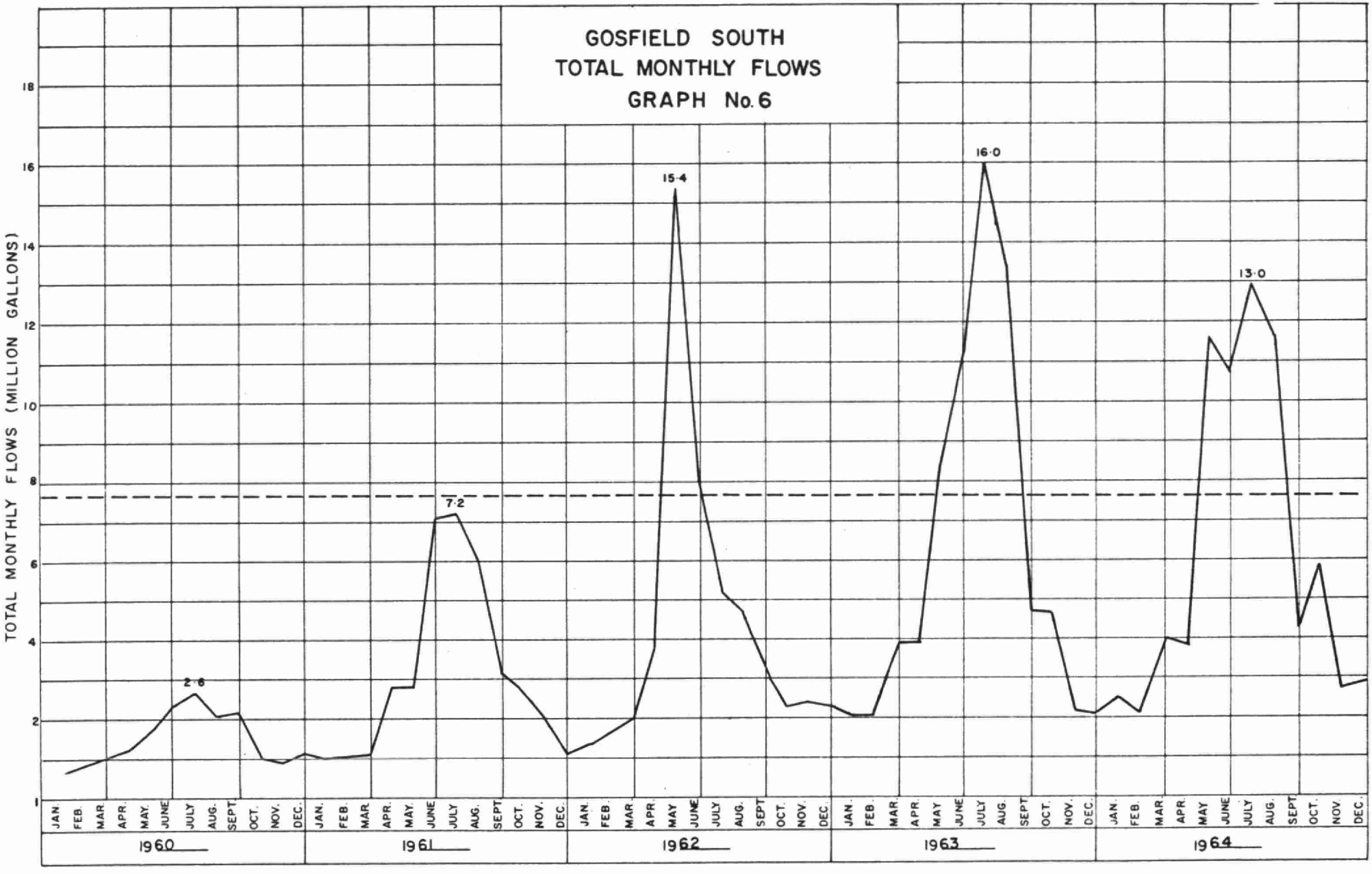

UNION WATER TREATMENT PLANT
TOTAL MONTHLY FLOWS
TREATED WATER
GRAPH No. 1
DESIGN CAPACITY
231·8
TOTAL MONTHLY FLOWS (MILLION GALLONS)
250
200
150
100
50
0
160
165
165
190
194
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT OCT. NOV. DEC.
1960
1961
1962
1963
1964

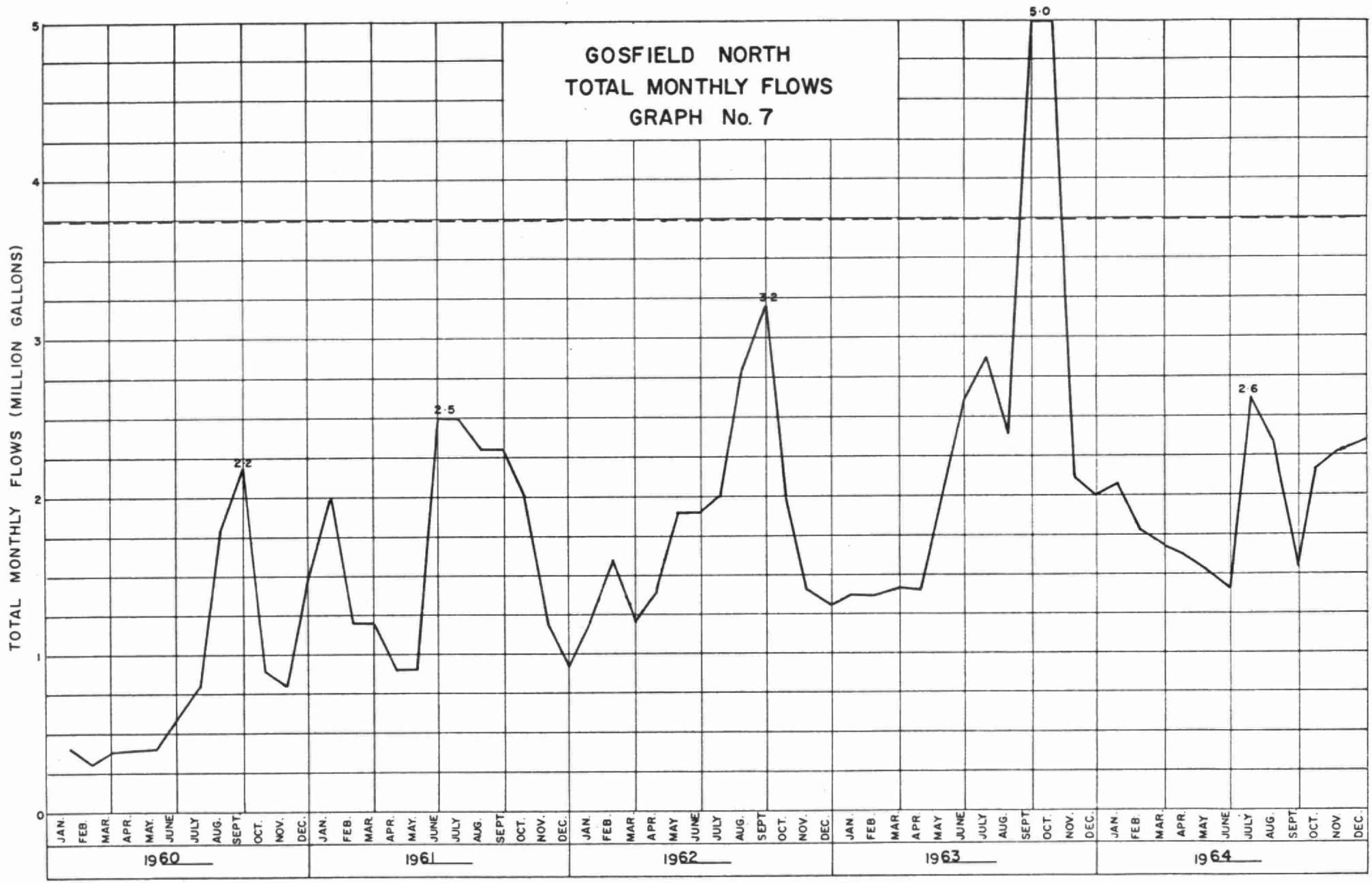

H.J. HEINZ
TOTAL MONTHLY FLOWS
GRAPH No. 2
TOTAL MONTHLY FLOWS (MILLION GALLONS)
100
90
80
70
60
50
40
30
20
10
0
79
72
74
63
71
JAN. FEB. MAR APR. MAY JUNE JULY AUG. SEPT OCT. NOV. DEC.
1960
1961
1962
1963
1964

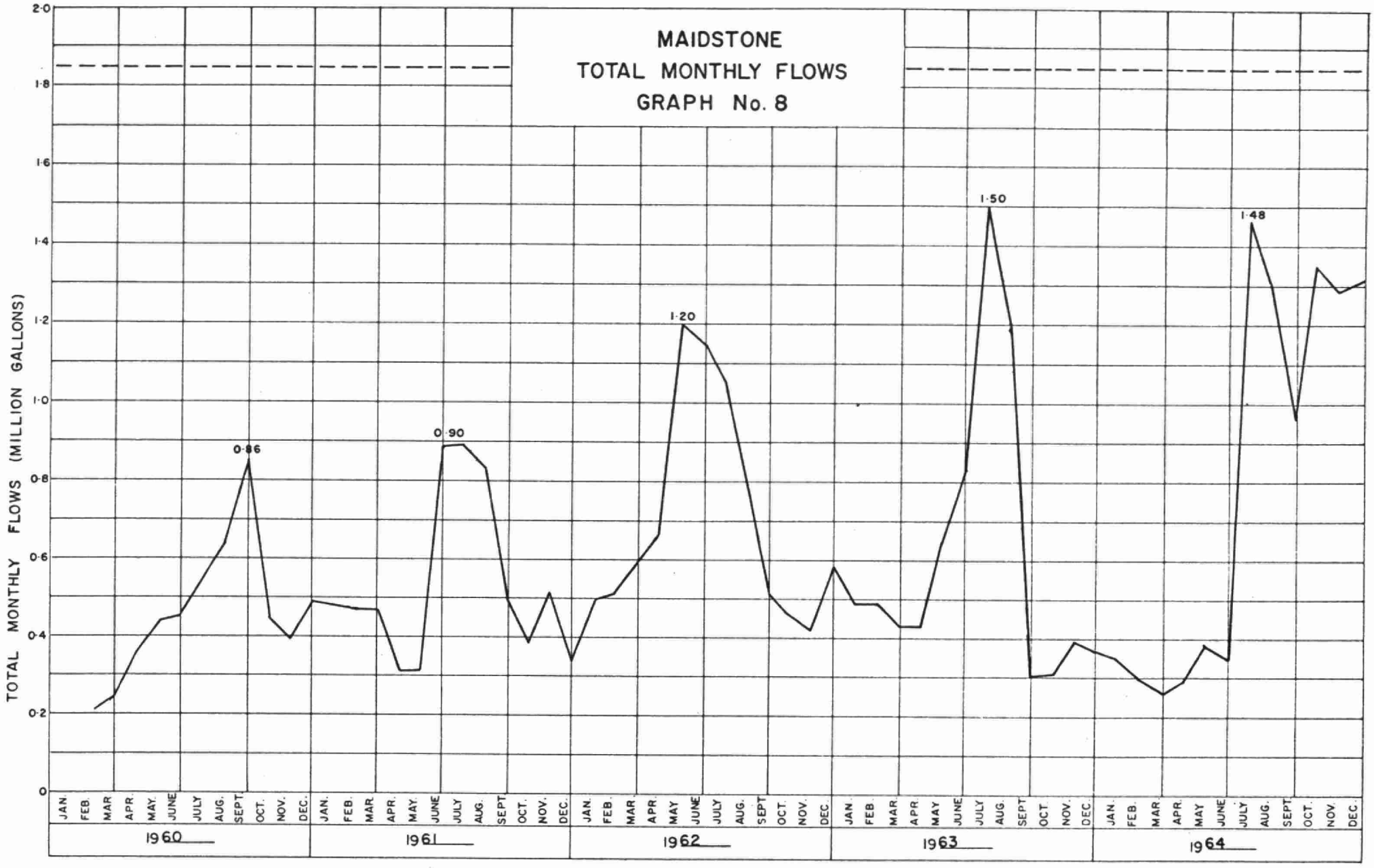

LEAMINGTON
TOTAL MONTHLY FLOWS
GRAPH No.3
TOTAL MONTHLY FLOWS (MILLION GALLONS)
0
10
20
30
40
50
60
70
80
43
48
51
63
56
JAN. FEB. MAR. APR. MAY. JUNE JULY AUG. SEPT. OCT. NOV. DEC.
1960
1961
1962
1963
1964

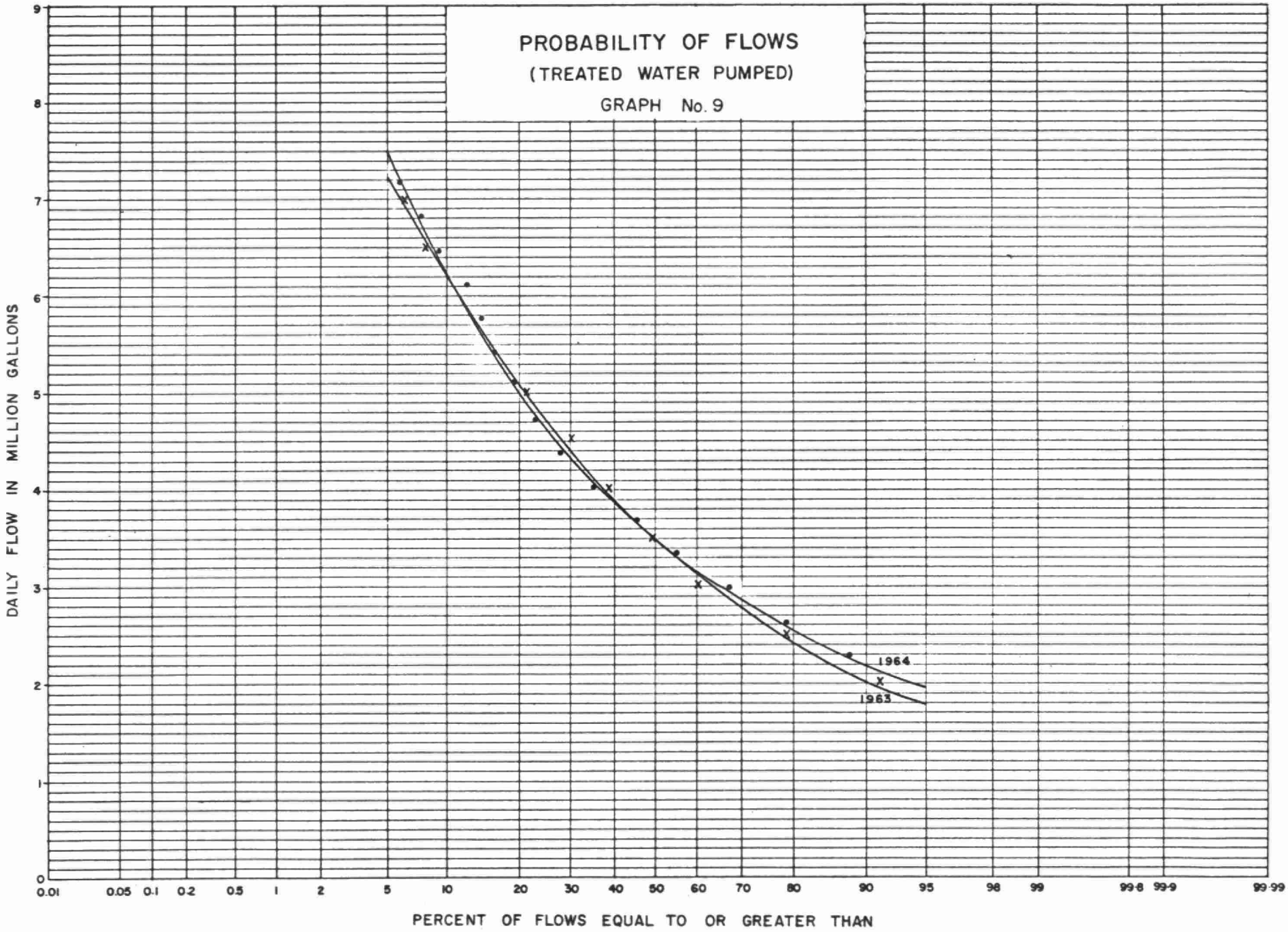

ESSEX
TOTAL MONTHLY FLOWS
GRAPH No. 4
TOTAL MONTHLY FLOWS (MILLION GALLONS)
0
10
20
30
40
18
20
24
26
26·5
JAN. FEB. MAR. APR. MAY. JUNE JULY AUG. SEPT OCT. NOV. DEC.
1960
1961
1962
1963
1964


MERSEA
TOTAL MONTHLY FLOWS
GRAPH No.5
TOTAL MONTHY FLOWS (MILLION GALLONS)
0
10
20
30
9
16
25
25
21
JAN. FEB. MAR APR. MAY. JUNE JULY AUG. SEPT OCT. NOV. DEC.
1960
1961
1962
1963
1964


GOSFIELD SOUTH
TOTAL MONTHLY FLOWS
GRAPH No. 6
TOTAL MONTHLY FLOWS (MILLION GALLONS)
18
16
14
12
10
8
6
4
2
1
2·6
7·2
15·4
16·0
13·0
JAN. FEB. MAR. APR. MAY. JUNE JULY AUG. SEPT OCT. NOV. DEC.
1960
1961
1962
1963
1964


GOSFIELD NORTH
TOTAL MONTHLY FLOWS
GRAPH No. 7
TOTAL MONTHLY FLOWS (MILLION GALLONS)
0
1
2
3
4
5
2·2
2·5
3·2
5·0
2·6
JAN. FEB. MAR. APR. MAY. JUNE JULY AUG. SEPT. OCT. NOV. DEC.
1960
1961
1962
1963
1964

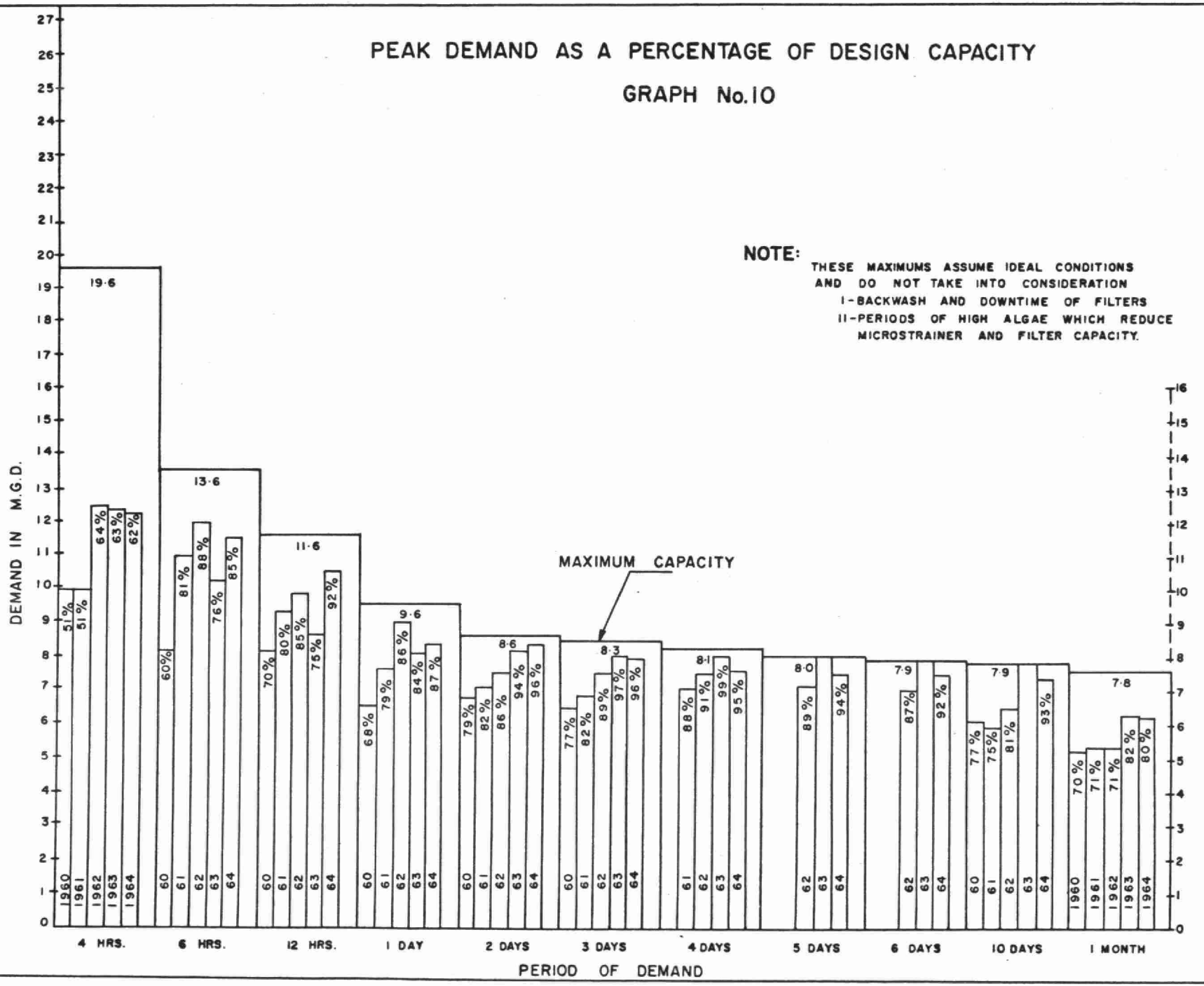

MAIDSTONE
TOTAL MONTHLY FLOWS
GRAPH No. 8
TOTAL MONTHLY FLOWS (MILLION GALLONS)
2·0
1·8
1·6
1·4
1·2
1·0
0·8
0·6
0·4
0·2
0
0·86
0·90
1·20
1·50
1·48
JAN. FEB. MAR. APR. MAY. JUNE JULY AUG. SEPT. OCT. NOV. DEC.
1960
1961
1962
1963
1964


PROBABILITY OF FLOWS
(TREATED WATER PUMPED)
GRAPH No. 9
DAILY FLOW IN MILLION GALLONS
0
1
2
3
4
5
6
7
8
9
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99
PERCENT OF FLOWS EQUAL TO OR GREATER THAN
1964
1963

PEAK DEMAND AS A PERCENTAGE OF DESIGN CAPACITY

GRAPH No.10

NOTE:
THESE MAXIMUMS ASSUME IDEAL CONDITIONS AND DO NOT TAKE INTO CONSIDERATION
I - BACKWASH AND DOWNTIME OF FILTERS
II - PERIODS OF HIGH ALGAE WHICH REDUCE MICROSTRAINER AND FILTER CAPACITY.



UNION WATER SYSTEM

1964 FLOW DATA

ADJUSTED MONTHLY FLOWS BY PARTICIPANT

Flows expressed in Million Gallons (MG)

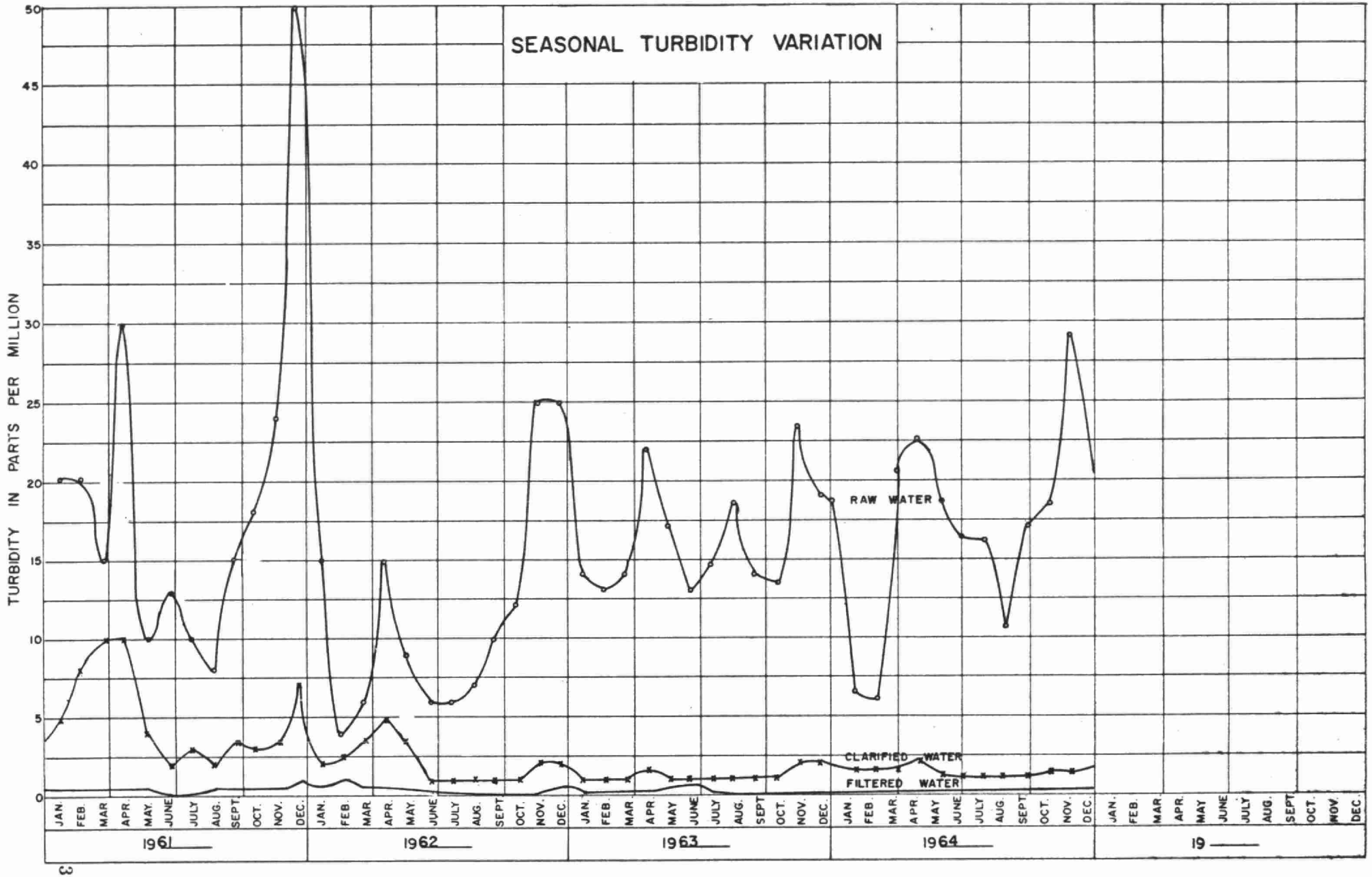
Month	Gosfield South	Mersea	Leamington	Essex	Maidstone	Gosfield North	Heinz	Total
January	2.461	5.260	23.800	11.870	0.344	2.060	41.500	87.295
February	2.139	4.583	20.638	10.302	0.299	1.788	30.845	70.594
March	3.990	7.810	26.610	12.200	0.281	1.695	32.050	84.636
April	3.825	7.507	23.634	11.728	0.270	1.626	31.534	80.124
May	11.680	20.850	38.790	14.000	0.384	1.533	36.300	123.537
June	10.703	19.036	35.248	12.784	0.349	1.405	39.875	119.400
July	12.950	17.300	56.500	26.450	1.470	2.630	47.742	165.042
August	11.617	15.413	50.427	23.703	1.305	2.332	61.258	166.055
September	4.160	7.490	31.000	12.500	0.965	1.531	71.418	128.814
October	5.865	10.556	43,568	17.302	1.358	2.160	53.003	133.812
November	2.781	6.030	28.610	10.850	1.290	2.270	46.495	98.326
December	2.837	6.128	29.145	11.020	1.311	2.316	48.977	101.734
Totals 1964	75.008	127.963	407.970	174.459	9.626	23.346	540.997	1359.369
Totals 1963	74.960	137.710	455.700	177.070	7.460	29.530	520.400	1402.830
% Diff. 64/63	+0.07	-7.08	- 10.48	- 1.48	+29.05	-20.93	+ 3.96	- 3.02

COMMENTS

The chart of Adjusted Flows is merely a monthly representation of the bimonthly flow determinations as per meter readings taken by participants and the plant staff. The difference between 1964 and 1963 consumption by participant is shown on the last line.

TURBIDITY

The graph of seasonal turbidity variations shows that the 1964 highs and lows were more extreme than in the recent past and that the raw water turbidity is trending upwards. The turbidity in the clarified and filtered water remained at very satisfactory levels with the overall removal efficiency holding at better than 99%.


SEASONAL TURBIDITY VARIATION
TURBIDITY IN PARTS PER MILLION
RAW WATER
CLARIFIED WATER
FILTERED WATER
1961
1962
1963
1964
19

CHLORINATION

Month	Treated Plant Flow (MG)	Pre-Chlorination (lbs. Chlorine)	Pre-Dosage Rate (ppm)	Post-Chlorination (lbs. Chlorine)	Post Dosage Rate (ppm)
January	85.597	1026.75	1.20	343.25	.40
February	68.721	1052.25	1.53	352.75	.51
March	76.597	1195.25	1.56	396.75	.52
April	82.030	1161.50	1.42	388.50	.47
May	121.480	3188.00	2.62	1068.00	.88
June	148.071	4443.75	3.00	1492.75	1.01
July	193.812	6005.50	3.10	1992.50	1.03
August	139.687	5557.50	3.98	1850.50	1.32
September	158.951	5129.50	3.23	1705.50	1.07
October	110.076	2553.50	2.32	856.50	0.78
November	89.431	2142.00	2.40	708.00	0.76
December	93.624	1913.25	2.40	636.75	0.68
Total	1368.077	35368.75		11791.75	
Average	114.006	2947.40	2.58	982.65	0.86

COMMENTS

During 1964, an average dosage of 2.58 ppm of chlorine was used in prechlorination to maintain a residual of 0.15 ppm. An average dosage of 0.86 ppm of chlorine was used in post-chlorination to maintain a residual of 0.5 ppm in the treated water pumped to the distribution system. A total of 35,369 pounds of chlorine were used which is a decrease of 5.9% over 1963.

CONCLUSIONS

The very rapid increase in water consumption experienced by Gosfield South and Mersea Townships was retarded somewhat in 1964 due to the wet season. Irrigation within these two municipalities continues to be a significant part of their total annual consumption.

There appears to be a trend toward a stability in monthly demand for all participants.

RECOMMENDATIONS

The Local Advisory Committee policy for controlling field irrigation should continue in force until the Gore and Storrie Report is finished and the future development of the Union Water System can be clearly seen.


ONTARIO WATER RESOURCES COMMISSION